

The effects of education on crime

Groot, Wim; Maassen van den Brink, Henriette

Postprint / Postprint

Zeitschriftenartikel / journal article

Zur Verfügung gestellt in Kooperation mit / provided in cooperation with:

www.peerproject.eu

Empfohlene Zitierung / Suggested Citation:

Groot, W., & Maassen van den Brink, H. (2009). The effects of education on crime. *Applied Economics*, 42(3), 279-289. <https://doi.org/10.1080/00036840701604412>

Nutzungsbedingungen:

Dieser Text wird unter dem "PEER Licence Agreement zur Verfügung" gestellt. Nähere Auskünfte zum PEER-Projekt finden Sie hier: <http://www.peerproject.eu> Gewährt wird ein nicht exklusives, nicht übertragbares, persönliches und beschränktes Recht auf Nutzung dieses Dokuments. Dieses Dokument ist ausschließlich für den persönlichen, nicht-kommerziellen Gebrauch bestimmt. Auf sämtlichen Kopien dieses Dokuments müssen alle Urheberrechtshinweise und sonstigen Hinweise auf gesetzlichen Schutz beibehalten werden. Sie dürfen dieses Dokument nicht in irgendeiner Weise abändern, noch dürfen Sie dieses Dokument für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, aufführen, vertreiben oder anderweitig nutzen.

Mit der Verwendung dieses Dokuments erkennen Sie die Nutzungsbedingungen an.

gesis
Leibniz-Institut
für Sozialwissenschaften

Terms of use:

This document is made available under the "PEER Licence Agreement ". For more Information regarding the PEER-project see: <http://www.peerproject.eu> This document is solely intended for your personal, non-commercial use. All of the copies of this documents must retain all copyright information and other information regarding legal protection. You are not allowed to alter this document in any way, to copy it for public or commercial purposes, to exhibit the document in public, to perform, distribute or otherwise use the document in public.

By using this particular document, you accept the above-stated conditions of use.

Mitglied der

Leibniz-Gemeinschaft



The effects of education on crime

Journal:	<i>Applied Economics</i>
Manuscript ID:	APE-06-0388.R1
Journal Selection:	Applied Economics
Date Submitted by the Author:	18-Jul-2007
Complete List of Authors:	Groot, Wim; Maastricht University, Department of Health Organization, Policy and Economics Maassen van den Brink, Henriette; University of Amsterdam, Department of Economics
JEL Code:	I21 - Analysis of Education & I2 - Education & I - Health, Education, and Welfare
Keywords:	education, crime, social cost



THE EFFECTS OF EDUCATION ON CRIME*

by

Wim Groot**

Department of Health Sciences, Maastricht University
and

"Scholar" Research Center for Education and Labor Market
Department of Economics, University of Amsterdam

Henriëtte Maassen van den Brink

"Scholar" Research Center for Education and Labor Market
Department of Economics, University of Amsterdam

JEL classification: I21

Keywords: education, crime

Abstract

In this paper we use a unique data-set on criminal behavior to analyze the effects of education on offences and crimes committed. The findings suggest that substantial savings on the social costs of crime can be obtained by investing in education. We find that the probability of committing crimes like shop lifting, vandalism and threat, assault and injury decrease with years of education. The probability of committing tax fraud, however, increases with years of education. We further find that higher educated people have more permissive attitudes and social norms towards criminal behavior.

* We thank an anonymous referee for helpful comments on a previous version of this paper.

** Address: Wim Groot, Department of Health Sciences, Maastricht University, P.O. Box 616, 6200 MD Maastricht, The Netherlands; Telephone number: +31 - 43 - 388 1588/1727; Fax number: +31 - 43 - 367 0960; E-mail: w.groot@beoz.unimaas.nl. Henriëtte Maassen van den Brink, Department of General Economics, University of Amsterdam, Roetersstraat 11, 1018 WB Amsterdam, the Netherlands; E-mail: h.maassenvandenbrink@uva.nl.

Introduction

Crime is major source of insecurity and discomfort in our society. Victims of criminality are frequently traumatized by it, with long lasting negative effects on their well-being. Criminality gives rise to feeling of insecurity among people who have not been a victim, as well. This also generates negative effects on well-being. High crime rates may further inhibit people from undertaking activities. Especially elderly people frequently become afraid to go out at night. Also trust in ones fellow men is negatively affected by high crime rates.

In the Netherlands one in six people becomes victim of criminal behavior annually (figures pertaining to 1998). Especially, the chance of becoming a victim of bicycle theft is high: every 47 seconds a bicycle is stolen in the Netherlands. Among a population of a little over 16 million people, a person becomes victim of murder or manslaughter once every 37 hours. Two percent of all Dutch households are victim of a burglary every year.

The costs of crime are substantial. The Dutch Ministry of Justice has calculated that in 1998 the per capita costs of crime were €590 per year. The total costs of tracing, prosecution and detention of criminals amounted to €4.3 billion per year. This is excluding other social costs such as the (property) damage and the costs of (health) care inflicted by criminal behavior. The other social costs were estimated to amount to €5 billion. The total costs of criminality in the Netherlands can therefore be estimated at €9.3 billion per year. On top of that it is estimated that forgone tax income due to tax fraud amount to €227 million. The total costs of crime are about 2.5% of GDP each year.

In general a reduction in crime can be achieved by more repression or more prevention. Education is potentially an important element to prevent individuals from engaging in criminal behavior.

The literature offers various explanations for the preventive force of education on crime. Lochner (2004) argues that education reduces crime because it increases the opportunity costs from forgone earnings and expected costs of incarceration. In his human capital model crimes for which the returns are increasing in education levels are more likely to be committed by higher educated people than crimes that offer no returns to skill.

Education may also change preferences. Arrow (1997) argues that schooling “imparts values by allegedly rewarding diligence, performance, conformity, cooperation and competition” (p. 15). An alternative explanation is that education contributes to a lower time preference (Becker 1996), i.e. schooling makes that individuals postpone the direct satisfaction of needs. Becker & Mulligan (1994) argue that education leads to a lower time preference for consumption in the present and a higher time preference for consumption in the future: “Schooling also determines[investments in time preference] partly through the study of history and other subjects, for schooling focuses students’ attention on the future. Schooling can communicate images of the situations and difficulties of adult life, which are the future of childhood and adolescence. In addition, through repeated practice at problem solving, schooling helps children to learn the art of scenario simulation. Thus, educated people should be more productive at reducing the remoteness of future pleasures” (Becker & Mulligan 1994, p. 10).

With a higher time preference for consumption in the future individuals will weigh the future consequences – i.e. punishment - of their current criminal actions

more heavily. If more education leads to a higher time preference for consumption in the future this will deter people with a higher education from committing criminal acts. A lower time preference for consumption in the present works in the same way: it makes immediate gratification of preferences and desires through criminal activities less important.

A few empirical studies have addressed the relation between education and crime. Tauchen & Witte (1994) find that young people who are in paid employment or go to school are less likely to engage in criminal behavior. Lochner & Moretti (2004) calculate that for white people in the United States a secondary education reduces the probability of a jail sentence by 0.76 percentage points. For black people the effect of a secondary education is even higher: 3.4 percentage points. They calculate that the externalities of education through its reduced effect on crime is 14 to 26% of the private return to education. This suggests that a reduction in criminal behavior contributes largely to the social rate of return to education in the US.

Consistent with his human capital model of crime, Lochner (2004) also finds strong negative effects of education on property and violent crime, while arrests rates for white collar crime are increasing in average educational attainment.

Not all studies find that higher educated people are less likely to engage in criminal behavior. For example, Ehrlich (1975) finds a positive relation between years of education and theft committed in 1960.

Fajnzylber, Lederman & Loayza (2002) use aggregated time series data for developed and developing countries covering the period 1970-1994 to analyze the determinants of levels of criminality. They find that the average education level in a country does not have a statistical significant effect on the number of homicides and

1
2
3 robberies. This cross-national analyses, however, does not preclude that within a
4
5 country there are differences in criminal behavior between higher and lower educated
6
7 people. Using annual data on criminal activity for twenty Italian regions over the
8
9 period 1980-1995, Buonanno & Leonida (2006) find that average years of schooling
10
11 in the regional pupolation has a negative and significant effect on crime rate.
12
13

14
15 Finally, Jacob & Lefgren (2003) examine the short-term effect of school on
16
17 juvenile crime. They find that on days when school is in session the level of property
18
19 crime committed by juveniles decreases by 14%, but the level of violent crime
20
21 increases by 28%. They conclude that both incapacitation and concentration
22
23 influence juvenile crime.
24
25

26
27
28
29 In this paper we analyze the relation between education and various forms of crime
30
31 and offences. Using a unique data set on criminal behavior we will describe and
32
33 explain the relation between education and criminal behavior. We will also look at the
34
35 effects of education on norms and attitudes towards offences and crime. Finally, we
36
37 use information on the social costs of criminality to calculate the potential savings
38
39 from increased investment in education.
40
41
42
43
44
45
46
47
48

49 **Data and descriptive analyses of criminal behavior**
50

51
52
53 The data for the empirical analyses are taken from the 'Netherlands Survey on
54
55 Criminality and Law Enforcement'. This survey was conducted in 1996 among 2951
56
57 respondents aged 15 and older, i.e. 1939 respondents aged 15 years and older and
58
59
60

another 1012 respondents aged 15 to 30 years.¹ The survey consists of a face-to-face interview and a written questionnaire. The response rate of the face-to-face interview was 41% (ratio of interviews to usable addresses for interview). Of the respondents who participated in the oral interview 74% returned the written questionnaire.

Questions on committed crimes and offences are apt to produce socially desirable responses if the questions have to be answered directly to the interviewer by the respondent. Therefore the respondents could fill out this part of the questionnaire themselves on a computer without the interviewer being able to see the answers.

In table 1 the frequency distribution of crimes and offences ever committed is presented by level of education. The results suggest that offences and petty crimes are more frequently committed by higher educated people. The frequency of more serious crimes – threatening and assaulting people, and inflicting injury – is higher among lower educated people, however.

Higher educated people are more likely to have engaged in fare dodging in public transport. Among the respondents with a university degree 56% says that they have committed this offence. Drunk driving is also more frequent among higher educated people. Tax fraud is more common among the higher educated, as well. Over 27% of the respondents with a university degree and 22% of those with higher vocational education report to have committed tax fraud. It has to be kept in mind, however, that higher educated are more likely to earn a high income and that higher income earners are more likely to be obliged to return a tax form. However, the

¹ The data are stored as file P1465 at the Steinmetz Archive and can be obtained from the Netherlands Institute of Scientific Information (NIWI) in Amsterdam.

results in table 1 show that higher educated are more likely to engage in insurance and social security fraud as well.

Shop lifting and theft from work is committed relatively more frequently by the higher educated. Switching price tags in a shop, fencing of stolen goods, and theft of money occurs among people of all education levels in about equal measure. Lower educated people are, however, more likely to have committed theft from a house or a car.

Vandalism occurs more frequently among the lower educated than among higher educated. For example, more than 10% of the respondents with only primary education say that they have at least once vandalized public property in their life and almost 11% of those with a higher secondary education say they have vandalized private property. This is almost twice as much as the percentage of higher educated that report to have committed acts of vandalism.

Threat, assault, and injury are all serious crimes. Among this category of crimes we observe that the lower educated more frequently say that they have committed them than the higher educated. For example, about 9% of the respondents with a lower vocational education or less have at least once threatened someone and almost 8% has assaulted someone. Among people with a university degree this is 'only' 1.3% and 1.9%.

Table 1 around here

The figures in table 1 about offences and crimes ever committed may lead to biased conclusions about the differences in criminal behavior between higher and lower educated. A reason for this bias is cohort differences in education level: younger

cohorts are relatively higher educated than older cohorts. Two types of bias can be distinguished. First, older cohorts (i.e. people with a below average level of education) have had more time ever to commit offences and crimes. For this reason it is better to analyze offences and crimes committed in one specific year. Secondly, the inclination to commit crimes and the norms and attitudes towards criminal behavior may differ between younger and older cohorts. The norms and attitudes towards criminal behavior may be more lenient among younger and more educated cohorts.

Whether the results in table 1 are biased by age differences in education level can be seen when we compare these results with those on offences and crimes committed in one single year. The questionnaire contains separate questions on offences and crimes committed in 1995, i.e. the year before the survey was conducted. The frequency distribution of the responses by level of education is found in table 2.

If we only look at offences and criminal acts committed in 1995, we conclude that the lower educated are more likely to display criminal behavior than the higher educated. Offences and petty crimes are more frequently committed by higher educated people, however. Higher educated more frequently report that they have engaged in fare dodging, drunk driving, tax fraud and theft from work in 1995. More than 16% of the respondents with a university degree say that they have engaged in fare dodging for public transportation in 1995, while 7% say that they have driven a car after using alcohol. Perpetrators of shop lifting, theft of money, fencing, vandalism, threat, assault and injury are more frequently found among the lower educated. About 2% of the respondents with a lower vocational educational say they

have threatened someone in 1995, while less than 1% of the respondents with intermediate vocational education or higher say that they have assaulted someone.

Table 2 around here

The effects of education on criminal behavior

As noted before, figures on offences and crimes ever committed will yield biased conclusions on the effects of education. We therefore use figures on criminal behavior in 1995 for our empirical analyses. This, however, raises additional problems as the number of respondents that report to have engaged in an offence or criminal act is in many instances too few to be useful for the analyses. To solve this we merge some of the separate items, i.e. we reduce the eighteen categories of offences and criminal acts to five. These are: shop lifting (switching price tags or shop lifting), theft (bicycle theft, theft from work, theft from a house or car and theft of money), vandalism (vandalism of public property or vandalism of private property), violence (threat, assault or injury), and tax fraud.² A little over 3% of the respondents have committed shoplifting in 1995, while 4.8% report to have committed other kinds of theft. Almost one in ten (9.7%) of the respondents committed vandalism and a little more than one in twenty (5.1%) committed an act of violence. Tax fraud was committed by 3.3% of the respondents.

To determine the effect of education on criminal behavior, we estimate probit equations for each of these five categories. In the equations, we include not only

² We ignore fare dodging and drunk driving as these categories are difficult to merge with one of the others, and – at least fare dodging – is considered by many as only a minor offence.

years of education of the respondent, but also years of education of both parents. By including years of education of the parents in the equations, we can control for possible common genetic or social factors that affect both the education level attained by the respondents as the participation in criminal behavior. I.e. by including years of education of the parents we can separate the effects of social background and the genetic endowment (such as intelligence) that may affect both the educational attainment of the respondent and his/her participation in offences and crime. Further on, we will also discuss the results of another approach - an Instrumental Variable approach - to correct for possible third factors in the relation between education and criminal behavior.

Aside from the education variables we control for a number of other individual characteristics in the equations: age, gender, relationship with mother, relationship with father, a variable indicating whether the respondent had a difficult birth, the level of urbanization of the city of first residence, a variable indicating religious inclination, and a self-assessment of the respondent whether he/she thinks of him/herself as careless.

Relationship with father and mother refers to two questions about the quality of the relationship with the parents. Answering categories are on a five point scale running from 'very bad' to 'very good'. 'Difficult birth' refers to the answer to the question whether there were any complications at the birth of the respondent, while 'religion' refers to answer to the question whether the respondent considers himself a religious person. The self-assessment on carelessness is on a four point scale from 'almost never careless' to 'often careless'.

We expect that criminal behavior declines with age, is higher for men than for women, is higher for respondents who have a bad relationship with their parents, is

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

higher for respondents who have lived urban areas, is lower for people with strong religious convictions (and moral sense), and is higher for people who say that they are careless. Finally, we include the response to a question that was posed to the respondents at the end of the interview whether they had answered the questions honestly.

The parameter estimates of the probit equations are found in table 3. Years of education have a statistically significant effect on shoplifting, vandalism, violence and tax fraud, but not on ordinary theft. The sign of the years of education coefficient in the equations on shoplifting, vandalism and violence is negative: a year of education decreases the probability that someone will engage in these types of criminal behavior. To determine the size of these effects, we have to look at the marginal effects (these are reported at the bottom of the table). A year of education reduces the probability of shop lifting by 0.3 percentage points, the probability of vandalism by 0.2 percentage points and the probability of violence with 0.2 percentage points as well. The effect of years of education on tax fraud is positive: more years of education increase the probability of tax fraud. The marginal effect of a year of education on tax fraud is 0.4 percentage points.

Parental education only has an effect on violence. The two educational variables have opposite effects: the probability of violent behavior decreases if the mother is higher educated, but increases with years of education of the father. The negative effect of mother's education may be explained by the fundamental role mothers play in raising children. Higher educated mothers may be more able to prevent children from developing a violent character. Higher educated mothers may also impart values and norms that prevent violent behavior in children. The opposing

effect of father's education is more difficult to explain. However, we will show later on in the paper that higher educated father's appear to impart more lenient and liberal norms towards criminal behavior in their children. Perhaps these more lenient norms of children with higher educated fathers encourage violent behavior.

If we look at the effects of the other control variable, we see that age has a statistically significant and negative effect on the probability of shoplifting, theft, vandalism and violence. As expected the probability that one engages in this kind of criminal behavior decreases with age. Age does not have a statistically significant effect on tax fraud.

Men are more likely to commit offences and crimes like vandalism, violence and tax fraud than women. There are no statistically significant differences between men and women in the probability of shoplifting and other forms of theft, however.

Strong religious convictions decrease the probability of crimes like theft and violence. A religious conviction does not have a statistically significant effect on the three other types of offences and crimes distinguished.

Being careless has a statistically significant effect on shoplifting and theft. People who perceive themselves as careless are more likely to commit these crimes. The other variables included in the equations do not have a statistically significant effect on offences and crimes.

A number of tests were performed on the robustness of the results. First, we tested whether there are structural differences between groups. We tested whether the coefficients differ between men and women. This appears only to be the case for shoplifting. For the other types of offences and crimes there are no structural differences between men and women. We have chosen not to present separate

results for men and women, as the number of (positive) observations becomes too small then (i.e. less than thirty positive observations).

Next, we tested whether the results differ between respondents aged 30 and older and respondents younger than 30. Because of the limited number of (positive) observations this could only be done for shoplifting and theft. The test statistics in table 3 show that there are no structural differences between both age groups in the determinants of shoplifting and theft.

A third test we performed was to see whether the education effects differ between men and women and whether the education effects change with age. For none of the five types of offences and crimes distinguished do we find gender and age differences in the education effects.

Table 3 around here

An important question to answer is whether the relation between education and criminal behavior is really a causal relation. The relation between education and criminal behavior is merely a correlation and not a causal relation if a) there is a joint relation between education and criminal behavior, whereby education not only affects criminal behavior but there is also a reverse causality where criminal behavior determines investments in education, or b) there are other factors that affect both education and criminal behavior. The causality question is important not only for determining the exact relation between education and criminal behavior, but also from a policy point of view. Only if the relation between education and criminal behavior is a true causal relation a shift in (public) expenditures from the repression

of crime (i.e. tracing, sentencing and jailing of criminals) to education can be effective in improving both the level of education and reducing the levels of crime in society.

One factor that may affect both education level and criminal behavior is the education level of the parents. Children with higher educated parents are more likely to attain a higher education level themselves. Higher educated parents are also better role models and may impart norms and values that prevent children from committing offences and criminal acts. As, discussed before we control for parental education in the estimations.

If there is a joint causal relation between education and criminal behavior, education is an endogenous variable in the equations explaining offences and crimes. We test for the endogeneity of education by applying an Instrumental Variable (IV) approach. The instruments we use are whether the father had a paid job when the respondent was aged 14 years, a variable indicating whether the mother had a paid job when the respondent was 14, and a variable indicating whether the respondent was reared in an incubator after birth. We also include age, gender, the quality of the relationship with both parents, whether the respondent had a difficult birth, and the level of urbanization of the city of first residence as explanatory variables. A frequently used instrument for schooling, are changes in the compulsory school-leaving age (see, for example, Lochner & Moretti 2004). In our estimations this proved to be a very weak instrument, and we therefore decided to omit this instrument. The estimation results of the OLS on years of education are found in the appendix.

The results of the IV-estimations can be found in table 4. In all of the estimations the IV-estimates yield statistically insignificant parameter estimates for years of education. A comparison of the IV-estimates with the coefficients of actual

years of education shows that in the equations where actual years of education has a statistically significant effect – i.e. in the equations on shop lifting, violence and tax fraud – the sign of the coefficient does not change if we use IV. The size of the effect is somewhat larger if we use IV in the equations for shoplifting and tax fraud, but becomes much smaller if we use IV in the equation on violence.

Before we can accept the results of the IV analyses we first have to check whether it is necessary and useful to use IV (the relevance of the instruments), whether we have used the right instruments (the validity of the instruments) and whether the quality of the instruments is good enough. To answer these questions we perform the tests proposed in Bound, Jaeger & Baker (1995) and some other tests.

The quality of the instruments is evaluated by two tests. The first is a F-test on the exclusion of the instruments in the years of education equation. The test statistics shows that the instruments are of good quality: the null-hypotheses that the joint instruments do not have a statistically significant effect on years of education is decisively rejected by the F-test. This indicates that the instruments are of good quality.

A second test on the relevance of the instruments is the Eigenvalue likelihood ratio test of Davis & Kim (2002). The eigenvalue of the likelihood ratio test is 0.017. At the 1% level the critical value of this test is 0.004. This implies that the null-hypotheses that the instruments are irrelevant is rejected.

The validity of the instruments is tested by a Sargan overidentification test. Here we test whether the instruments – aside from their effect on years of education – have a separate effect on criminal behavior. The test statistics show that the null-hypotheses that the instruments do not have a separate effect can not be rejected in

any of the five equations for criminal behavior. This indicates that our instruments are valid.

Finally, we test whether it is necessary to use instrumental variables. For this we perform a Hausman test. The test statistics indicate that in all five equations the null-hypotheses that years of education is not an endogenous variable in the equations on criminal behavior can not be rejected. It therefore does not seem necessary to use instrumental variables to establish the effect of education on criminal behavior.

We conclude that we have used valid and good quality instruments, but that it is not relevant to use instrumental variables. This implies that we base our interpretation on the specifications where we use actual years of education.

Table 4 around here

The effects of education on attitudes and social norms on criminal behavior

In this section we present results on attitudes and subjective social norms towards criminal behavior. The questionnaire includes a number of questions on attitudes and subjective norms. Attitudes refer to questions that ask to what extent respondents approve or disapprove of certain behavior, such as:

- Purposefully ride in a bus, streetcar or train without paying;
- To drive a car, while one had too much to drink (more than four glasses);

- Deliberately taking something from a shop without paying;
- To get or to buy something which you know or suppose to be stolen;
- To take a bicycle without permission and not returning it;
- Deliberately conceal something for the tax office or to make a false tax statement;
- Deliberately make a false claim on an insurance company (f.e. travel or household effects insurance);
- To take something of value from your work without returning it;
- To threaten someone;
- To kick or beat someone in such a way that he/she is done bodily harm, without it being self defense.

For each of these categories respondents could indicate their attitude on a scale from 1 to 5, ranging from ‘strongly disapprove’ to ‘somewhat approve’. The attitude towards offences and criminal behavior is determined by summing the responses on the separate items. This yields a scale from 10 to 50.

The social norm towards offences and criminal behavior is based on the same categories as the attitude questions. The difference is that to each question the following phrase is added: “..... then most people in my environment who are important to me would.....”. For example: “If I would threaten someone, then most people in my environment who are important to me would (strongly/somewhat) (dis)approve.”

The reliability of both scale is determined by Cronbach’s- α . The results in table 5 show that the reliability of both scales is high (0.85 and 0.87).

We performed regression analyses on both scales. The explanatory variables in both regression equations are the same as those included in the previous analyses. The results are found in table 5.

Years of education has a statistically significant and negative effect on both attitudes and social norms towards criminal behavior. Those with a higher education disapprove less of criminal behavior than people with a lower education. The social norms towards criminal behavior among the higher educated are also more permissive.

The size of the effect of a year of education on social norms is more than twice as large as the effect of a year of education on attitudes towards criminal behavior. This difference can probably be ascribed to the fact that higher educated people socialize more, and let their social norms be more determined by higher educated people. A higher education therefore seems to have more of an impact on social norms than on one's own attitude towards criminal behavior.

We further find that one's own attitude towards criminal behavior is more lenient if one's father is higher educated. Earlier we found that respondents with higher educated fathers engage in violent crime more frequently. Perhaps higher educated fathers impart more lenient values and norms towards criminal behavior on their children, and this may lead to more violent criminal activity. Years of education of the mother does not have a statistically significant effect on attitudes and social norms.

The other findings can be summarized as follows. Disapproval of criminal behavior is higher among:

- Older people than among younger people;
- Women than among men;

- Respondents with a good relationship with one or both of their parents;
- Respondents with strong religious convictions;
- Respondents who are not careless.

These findings are consistent with the notion that older generations, women, people with strong family ties and strong religious convictions have stronger and stricter moral values towards criminal behavior.

There appears to be a difference between actual behavior and attitudes and norms towards criminal behavior. Crime involving violence is more common among the lower educated. It must be noted, that of course only a small fraction of the lower educated engage in criminal behavior. On the other hand, the lower educated have a less permissive attitude and more stricter social norms towards criminal behavior than higher educated. Higher educated have more liberal attitudes and social norms but are less likely to be actually involved in threat, assault and injury, although they are more likely to commit offences like tax fraud, drunk driving and fare dodging.

Table 5 around here

The savings on the social costs of crime due to education

The results of the previous sections can be used to determine the savings on the costs of criminality that can be obtained by investing in education. The results in table 3 imply that the marginal effect of a year of education on the probability of shop lifting, vandalism and violence is approximately -0.002 : a year of education reduces the probability of participating in these types of crimes by 0.2 percentage points. The

marginal effect of a year of education on tax fraud is 0.004: a year of education increases the probability of tax fraud by 0.4 percentage points. The average probability of shoplifting, vandalism and violence is about 3%, while about 2% of the respondents indicate that they committed tax fraud in 1995. The relative effect of a year of education on the probability of shoplifting, vandalism and violent crime is approximately 6.7%, while the relative effect on tax fraud is about 20%.

In the introduction it was noted that in the Netherlands the annual total social costs of criminality amounted to €9.3 billion. The forgone tax revenues due to tax fraud amount to another €227 million per year. Using the relative effects described above, an increase in the average level of education of the population by one year would lead to a saving in the social costs of criminality of about €623 million per year and to an additional social cost because of tax fraud of €45 million. The net savings of an increase in the average level of education by one year are estimated to amount to €578 million.

Table 6 around here

Conclusion

The results in this paper suggest that substantial savings on the social costs of crime can be obtained by investing in education. We find that the probability of committing crimes like shoplifting, vandalism and threat, assault and injury decrease with years of education. The probability of committing tax fraud, however, increases with years of education. We further find that higher educated people have more permissive attitudes and social norms towards criminal behavior. One possible reason why

higher educated people are more permissive is that they are confronted less frequently with criminality and are less likely to be victim of a violent crime. Criminality tends to be higher in areas where lower educated people live. A second reason for more permissive attitudes and social norms towards criminality might be that higher educated have a more liberal world view in general.

Higher educated generally earn more than lower educated. The potential benefits of tax evasion and fraud increase with taxable earnings. This may explain why tax fraud increases with years of education. A second explanation is that higher educated are more knowledgeable and are more informed about the possibilities to commit tax fraud.

Finally, how to explain the greater likelihood of shoplifting, vandalism and violent crimes among lower educated? One explanation is that lower educated people have a higher time preference, which makes that they account the future consequences of their actions – punishment and sentencing – less than higher educated people. As was already mentioned in the introduction, Becker & Mulligan (1994) argue that education leads to a lower time preference for consumption in the present and a higher time preference for consumption in the future. A second explanation is education learns you to control your emotions, i.e. by schooling you can increase your restraint and self-control. Finally, higher educated people might be more informed about the consequences of their actions than lower educated people.

References

- Arrow, K. (1997), 'The benefits of education and the formation of preferences', in: J. Behrman & N. Stacey (eds.), *The Social Benefits of Education*, The University of Michigan Press, Ann Arbor, p. 11-16
- Becker, G. (1996), *Accounting for Tastes*, Harvard University Press, Cambridge MA
- Becker, G. & C. Mulligan (1994), 'On the endogenous determination of time preference', Discussion Paper 94-2, Economics Research Center/National Opinion research Center
- Buonanno, P. & L. Leonida (2006), 'Education and crime: evidence from Italian regions', *Applied Economics Letters* 13, p. 709-713
- Ehrlich, I. (1975), 'On the relation between education and crime', in: T. Juster (ed.), *Education, Income and Human Behavior*, McGraw-Hill, New York
- Fajnzylber, P., D. Lederman & N. Loayza (2002), 'What causes violent crime?', *European Economic Review* 46, p. 1323-1357
- Jacob, B. & L. Lefgren (2003), 'Are idle hands the devil's workshop? Incapacitation, concentration, and juvenile crime', *American economic Review* 93, p. 1560-1577
- Lochner (2004), 'Education, work, and crime: a human capital approach', *International Economic Review* 45, p. 811-843
- Lochner, I. & E. Moretti (2004), 'The effect of education on crime: evidence from prison inmates, arrests and self-reports', *American Economic Review* 94, 155-189
- Tauchen, H. & A. Witte (1994), 'Work and crime: an exploration using panel data', NBER Working Paper 4794

Table 1 Frequency distribution offences and crimes ever committed by higher education level								
	<i>Highest education level</i>							<i>All</i>
<i>Have you ever....?</i>	<i>Primary</i>	<i>Lower vocational</i>	<i>Lower secondary</i>	<i>Higher seconddary</i>	<i>Inter mediate vocational</i>	<i>Higher vocational</i>	<i>University</i>	
Fare dodging	18.2%	25.4%	31.9%	47.5%	31.7%	40.5%	55.5%	31.9%
Drunk driving	17.2%	29.5%	21.5%	15.0%	23.9%	26.6%	27.7%	23.2%
Switching price tags	9.6%	8.8%	12.6%	14.8%	12.2%	8.5%	10.3%	10.9%
Shop lifting	18.4%	17.8%	23.8%	31.1%	19.6%	22.9%	31.2%	21.9%
Vandalism public property	10.2%	7.2%	7.1%	8.4%	7.3%	5.2%	5.2%	7.6%
Vandalism private property	6.5%	5.7%	7.6%	10.9%	4.7%	4.4%	4.5%	6.3%
Fencing	18.1%	19.3%	23.0%	23.8%	21.1%	14.6%	20.6%	19.8%
Bicycle theft	7.1%	7.8%	10.1%	12.4%	7.6%	8.5%	11.0%	8.7%
Tax fraud	5.8%	9.8%	8.0%	10.0%	11.4%	21.7%	27.2%	11.4%
Social security fraud	3.1%	2.9%	3.0%	7.8%	3.5%	7.3%	6.5%	4.4%
Insurance fraud	2.1%	3.9%	5.2%	5.3%	6.1%	6.6%	8.4%	4.9%
Theft at work	5.5%	11.3%	6.5%	12.6%	6.7%	10.4%	10.5%	8.6%
Theft from car or home	2.4%	1.0%	2.2%	2.2%	0.3%	1.1%	1.3%	1.5%
Hit-and-run driving	2.1%	1.2%	1.4%	1.2%	1.5%	0.8%	3.2%	1.5%
Theft of money	7.2%	3.1%	6.3%	7.1%	4.4%	5.5%	4.5%	5.5%
Threat	9.0%	8.6%	7.4%	5.2%	5.4%	3.9%	1.3%	6.5%
Assault	8.0%	7.6%	5.7%	2.5%	5.1%	2.2%	1.9%	5.4%
Inflicting injury with weapon	1.0%	0.8%	0.0%	0.9%	0.5%	0.6%	0.0%	0.6%

Table 2 Frequency distribution offences and crimes committed in 1995 by higher education level

	<i>Highest education level</i>							<i>All</i>
<i>Have you?</i>	<i>Primary</i>	<i>Lower vocational</i>	<i>Lower secondary</i>	<i>Higher secondary</i>	<i>Intermediate vocational</i>	<i>Higher vocational</i>	<i>University</i>	
Fare dodging	4.4%	4.8%	7.9%	10.7%	4.0%	6.6%	16.2%	6.4%
Drunk driving	3.9%	7.6%	3.9%	5.6%	5.2%	8.0%	7.0%	5.8%
Switching price tags	2.1%	1.5%	1.9%	4.2%	0.9%	0.8%	0.0%	1.7%
Shop lifting	3.8%	0.9%	2.0%	3.2%	1.0%	0.0%	0.7%	1.8%
Vandalism public property	2.9%	0.8%	0.8%	0.3%	0.5%	0.0%	0.0%	1.0%
Vandalism private property	1.9%	0.2%	0.6%	1.9%	0.2%	0.0%	0.0%	0.8%
Fencing	4.7%	4.6%	5.2%	8.0%	4.9%	2.3%	3.2%	4.8%
Bicycle theft	1.3%	1.2%	1.9%	3.4%	1.2%	0.6%	1.3%	1.5%
Tax fraud	1.0%	1.5%	0.6%	1.9%	2.3%	5.3%	7.4%	2.2%
Social security fraud	0.3%	0.9%	0.0%	0.6%	0.8%	0.8%	0.0%	0.5%
Insurance fraud	0.5%	0.8%	1.4%	0.6%	0.9%	0.6%	0.7%	0.8%
Theft at work	0.8%	2.1%	2.1%	4.1%	2.6%	2.9%	4.6%	2.5%
Theft from car or home	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.6%	0.1%
Hit-and-run driving	0.3%	0.2%	0.5%	0.0%	0.2%	0.3%	0.6%	0.3%
Theft of money	1.6%	0.2%	0.6%	0.6%	0.5%	0.3%	0.0%	0.7%
Threat	2.1%	2.0%	1.4%	1.6%	0.7%	0.8%	0.0%	1.4%
Assault	2.0%	0.8%	0.8%	0.6%	1.0%	0.0%	0.0%	0.9%
Injury with weapon	0.2%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.1%

Table 3 Parameter estimates probit model crimes and offences committed in 1995 (standard errors in brackets)					
	<i>Shop lifting</i>	<i>Theft</i>	<i>Vandalism</i>	<i>Violence</i>	<i>Tax fraud</i>
Intercept	-1.028 (0.629)	-1.506** (0.498)	-1.052 (0.874)	-0.511 (0.663)	-3.450** (0.686)
<i>Education</i>					
Years of education	-0.042** (0.016)	0.023 (0.014)	-0.064* (0.028)	-0.054** (0.018)	0.080** (0.016)
Years of education mother	-0.023 (0.026)	0.014 (0.023)	-0.013 (0.036)	-0.087** (0.033)	-0.020 (0.028)
Years of education father	0.032 (0.022)	0.035 (0.020)	0.041 (0.031)	0.071** (0.027)	-0.021 (0.024)
<i>Individual characteristics</i>					
Age	-0.040** (0.007)	-0.027** (0.048)	-0.068** (0.017)	-0.026** (0.006)	0.001 (0.004)
Gender (male)	0.121 (0.106)	0.445 (0.095)	0.627** (0.163)	0.734** (0.137)	0.548** (0.120)
Relationship with mother	0.053 (0.090)	-0.119 (0.076)	-0.027 (0.134)	-0.266** (0.100)	0.089 (0.094)
Relationship with father	-0.086 (0.074)	-0.015 (0.071)	0.033 (0.121)	0.160 (0.108)	-0.089 (0.077)
Difficult birth	0.158 (0.156)	0.180 (0.144)	-0.184 (0.249)	-0.022 (0.203)	-0.001 (0.206)
Urbanisation level house of first residence	0.025 (0.038)	0.037 (0.034)	0.000 (0.054)	0.034 (0.043)	-0.006 (0.041)
Religious conviction	-0.201 (0.114)	-0.242* (0.100)	-0.304 (0.173)	-0.394** (0.137)	-0.154 (0.116)
Self-assessment Careless	0.198** (0.078)	0.205** (0.072)	0.280** (0.111)	0.085 (0.095)	0.088 (0.088)
Honesty of answers	0.253 (0.296)	-0.295 (0.195)	-0.023 (0.349)	-0.237 (0.222)	0.452 (0.382)
Loglikelihood	-326.125	-430.409	-168.712	-249.200	-278.149
Likelihood ratio test (LRT)-coefficients equal to zero	142.867**	140.825**	150.323**	121.457**	60.663**
Pseudo R2	0.074	0.065	0.097	0.051	0.033
Number of observations	2789	2590	2865	2847	2785
Average value dependent variable	0.032	0.048	0.017	0.023	0.023
LRT-coefficients men and women are equal	7.588	36.876**	21.310*	44.526**	-
LRT-coefficients respondents aged 30 and younger and respondents over 30 are equal	10.708	7.846	-	-	-
LRT-interaction years of	0.006	0.604	0.328	2.350	1.310

education and gender					
LRT-interaction years of education and age	0.470	0.366	0.000	0.356	0.000
Marginal effect of a year of education on criminality	-0.003	0.002	-0.002	-0.002	0.004

* significant at 5% level; ** significant at 1% level; - too few observations for testing restrictions.

Shop lifting = switching price tags or shop lifting; Theft = bicycle theft, theft at work, theft from car or home, theft of money; Vandalism = vandalism public property or vandalism private property; Violence = threat, assault or injury; Tax fraud = tax fraud.

Table 4 Summary parameter estimates probit model criminality with IV-estimators for years of education (standard errors in brackets)					
	<i>Shop lifting</i>	<i>Theft</i>	<i>Vandalism</i>	<i>Violence</i>	<i>Tax fraud</i>
Actual years of education	-0.060** (0.021)	0.002 (0.018)	-0.059 (0.045)	-0.069** (0.025)	0.094** (0.021)
Pseudo R2	0.089	0.083	0.106	0.058	0.043
Loglikelihood	-204.581	-266.153	-83.983	-122.791	-198.769
Number of observations	1811	1691	1849	1836	1787
Predicted years of education	-0.081 (0.670)	0.128 (0.124)	0.198 (0.195)	-0.001 (0.162)	0.159 (0.151)
Pseudo R2	0.086	0.082	0.109	0.051	0.012
Loglikelihood	-208.394	-265.622	-84.289	-126.615	-209.878
Number of observations	1811	1691	1849	1836	1787
F-test on exclusion of instruments	412.348**				
Sargan-overidentification test	3.932	2.304	1.460	1.088	0.404
Davis & Kim eigenvalue likelihood ratio test (critical value)	0.017** (0.004)				
Hausman-test	0.238	1.046	1.206	0.138	0.236

* significant at 5% level; ** significant at 1% level. Definition of the dependent variables and other control variables included in the equations, see table 3.

Table 5 OLS-regression attitudes and perceived social norms on norm deviant behavior (standard errors in brackets)		
	<i>Attitude towards norm deviant behavior (1=low. 5=high)</i>	<i>Perceived subjective norm towards norm deviant behavior (1=low. 5=high)</i>
Intercept	3.659** (0.137)	3.462** (0.153)
<i>Education</i>		
Years of education	-0.006* (0.003)	-0.016** (0.004)
Years of education mother	0.000 (0.006)	0.003 (0.007)
Years of education father	-0.011* (0.005)	-0.002 (0.006)
<i>Individual characteristics</i>		
Age	0.012** (0.001)	0.008** (0.001)
Gender (male)	-0.130** (0.024)	-0.108** (0.027)
Born outside the Netherlands	-0.092 (0.055)	-0.153* (0.061)
Birth was difficult	-0.041 (0.044)	-0.009 (0.049)
Relationship with mother	0.051** (0.020)	0.101** (0.022)
Relationship with father	0.050** (0.018)	0.057** (0.020)
Urbanisation level house of first residence	-0.010 (0.009)	-0.010 (0.010)
Religious conviction	0.205** (0.025)	0.179** (0.028)
Self-assessment Careless	-0.103** (0.019)	-0.062** (0.021)
Honesty answers	0.114* (0.055)	0.099 (0.061)
F-Test	55.439**	26.763**
R ²	0.197	0.104
Number of observations	2888	2888
Reliability scale (Cronbach- α)	0.849	0.866

* significant at 5% level; ** significant at 1% level.

Table 6 Savings on the costs of offences and criminality by increasing the level of education of the population

	<i>Theft. Vandalism and violence</i>	<i>Tax fraud</i>
Average probability of offence or criminality	0.030	0.020
Marginal effect of a year of education on offence or criminal behavior	-0.002	0.004
Social costs of offences and criminality in the Netherlands	9.3 billion euro	227 million euro
Savings and costs of an increase in average level of education by one year	623 million euro	-45 million euro
Savings and costs as a percentage of the total social costs	6.7%	-20%

Appendix Parameter estimates OLS years of education (standard errors in brackets)	
Intercept	9.487** (0.716))
Years of education mother	0.112** (0.035)
Years of education father	0.146** (0.029)
Age	0.002 (0.006)
Gender (male)	0.232 (0.163)
Relationship with mother	-0.291* (0.120)
Relationship with father	-0.005 (0.107)
Birth was difficult	-0.158 (0.270)
Urbanisation level house of first residence	0.057 (0.058)
Father had a paid job	1.024** (0.331)
Mother had a paid job	-0.642** (0.190)
Reared in an incubator as a baby	-1.120** (0.321)
Number of observations	1880
F-test	10.707**
R2	0.054

* significant at 5% level; ** significant at 1% level.